Making the Best of a Bad Situation: From leaking UST Over Fractured Bedrock with Closed Municipal Wells to Case Closure – A Success Story

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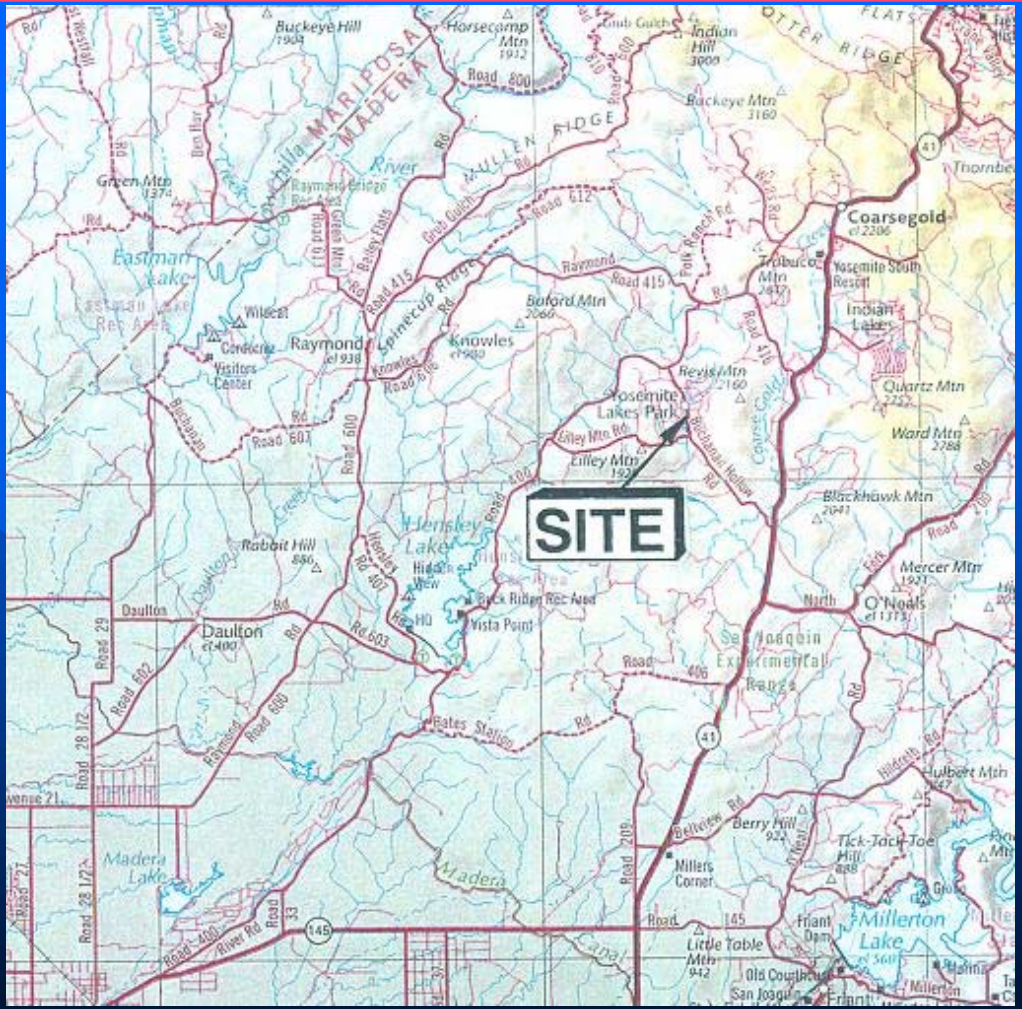
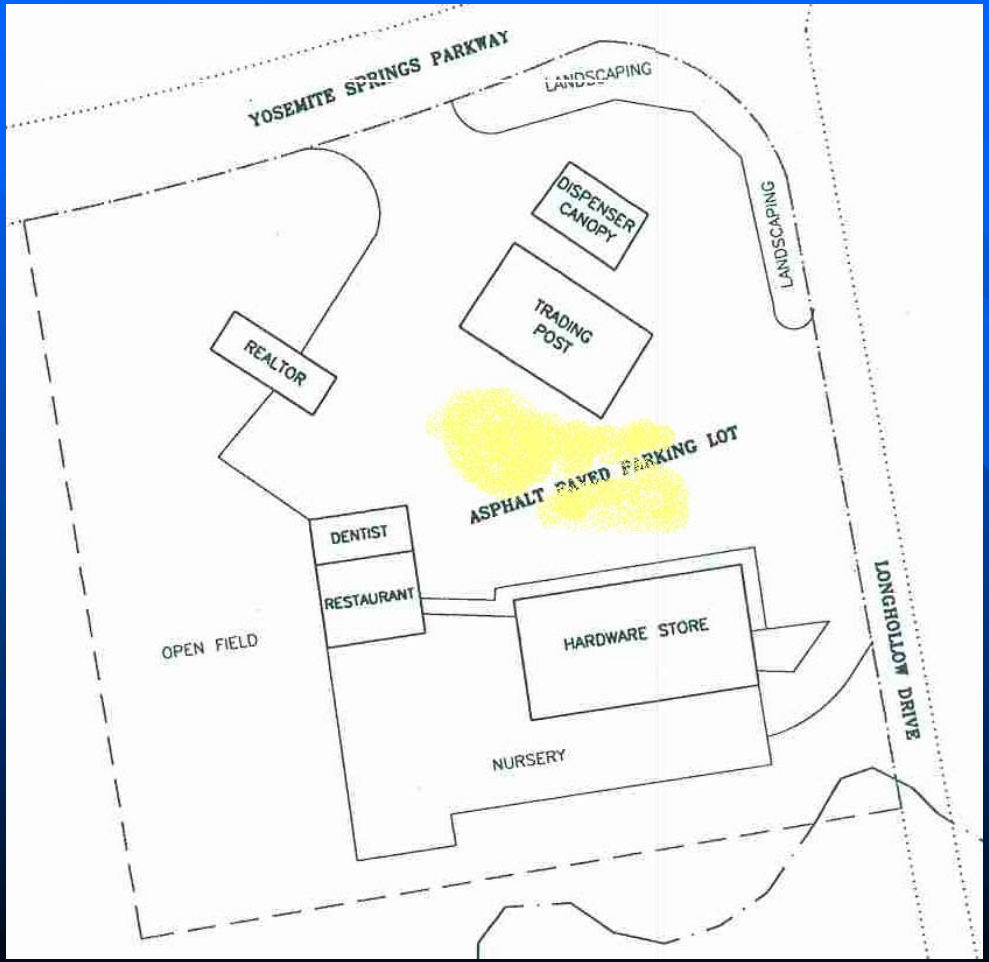
Jeff Hannel, P.G., C.H.G.
CRWQCB – Region 5, Fresno

Facility Location



Site Map


YOSEMITE SPRINGS PARKWAY
LANDSCAPING
DISPENSER CANOPY
LANDSCAPING
TRADING POST
REALTOR
ASPHALT PAVED PARKING LOT
DENTIST
RESTAURANT
HARDWARE STORE
OPEN FIELD
NURSERY
LONGHOLLOW DRIVE

Site Photo

UST Removals
March 1999

TPHg 160 mg/kg
Benzene 0.5 mg/kg
MTBE 120 mg/kg

YLP Aerial


200 ft
100 m
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JULY 21, 2000

The Fresno Bee

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Source of Madera well contamination sought

Testing is under way on grounds of suspected leakers.

BY JIM DAVIS
THE FRESNO BEE

COARSEGOLD — State water-quality officials are trying to determine the cause — and the extent — of contamination by a fuel additive that forced the closure of the main water well for the largest subdivision in eastern Madera County.

The additive known as MTBE was found last month in the well at Yosemite Lakes Park, about seven miles south of Coarsegold.

"There's hope that this is not a large problem," said John Noonan of the Central Valley Regional Water Quality Control Board in Fresno. "But it doesn't mean that it isn't."

The well is one of 16 for Yosemite Lakes Park, which has 1,400 homes and more than 3,000 residents.

Yosemite Springs Park Utility — the water company that provides water to the park — shut down the well as soon as the contamination was found, said Ken Harrington, the company's manager.

The company has been able to keep water pressure flowing normally, but Harrington is concerned about the loss.

"This well has always been what we referred to as our bread-and-butter well," Harrington said. "It's the only well — up until this happened — that we ran 365 days of the year."

MTBE, or methyl tertiary-butyl ether, is a gasoline octane booster designed to reduce air pollution. But research has indicated MTBE could cause cancer. In some areas of the state, leaking gasoline tanks have allowed MTBE to creep into surface and ground water.

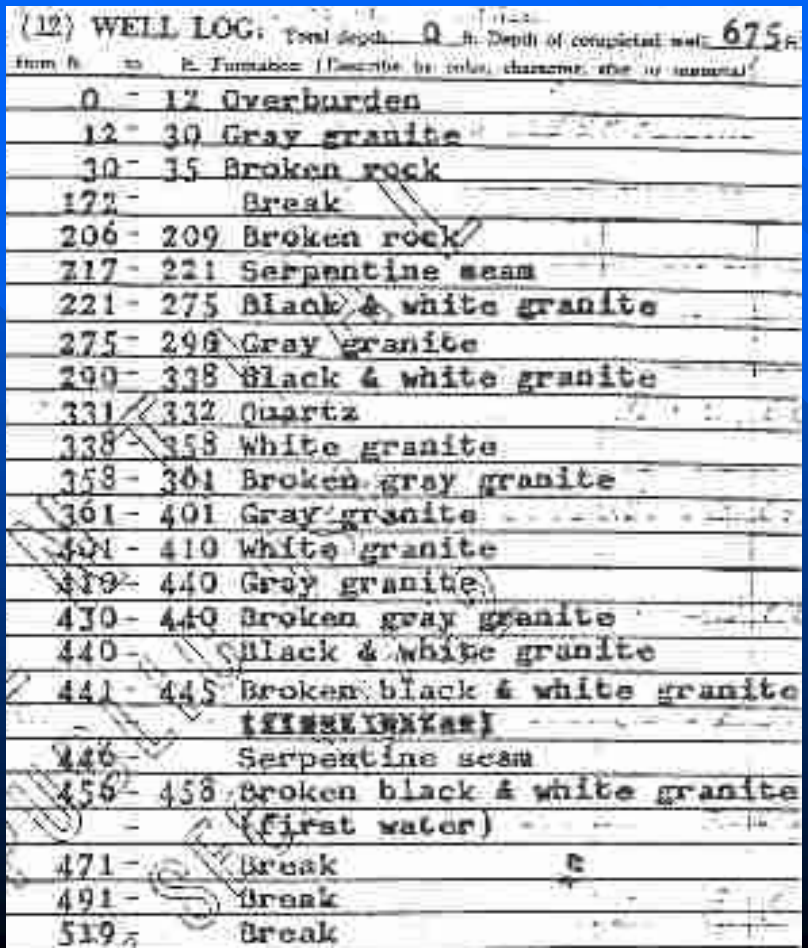
Last year, the Yosemite Lakes Trading Post replaced three gasoline tanks — one with a 4,000-gallon capacity and two with room for 2,000 gallons — as it upgraded to meet new standards.

As the tanks were being removed, a

Please see **LAKES**, Page A20

Impacted Supply Wells

Well 37A Log



(12) WELL LOG: Total depth 0 ft. Depth of completed well 675 ft.

from ft.	to	ft. Formation (Describe by color, character, size of material)
0	12	Overburden
12	30	Gray granite
30	35	Broken rock
172		Break
206	209	Broken rock
217	221	Serpentine seam
221	275	Black & white granite
275	290	Gray granite
290	338	Black & white granite
331	332	Quartz
338	358	White granite
358	361	Broken gray granite
361	401	Gray granite
401	410	White granite
419	440	Gray granite
430	440	Broken gray granite
440		Black & white granite
441	445	Broken black & white granite
		[illegible]
446		Serpentine seam
456	458	Broken black & white granite
		(first water)
471		Break
491		Break
519		Break

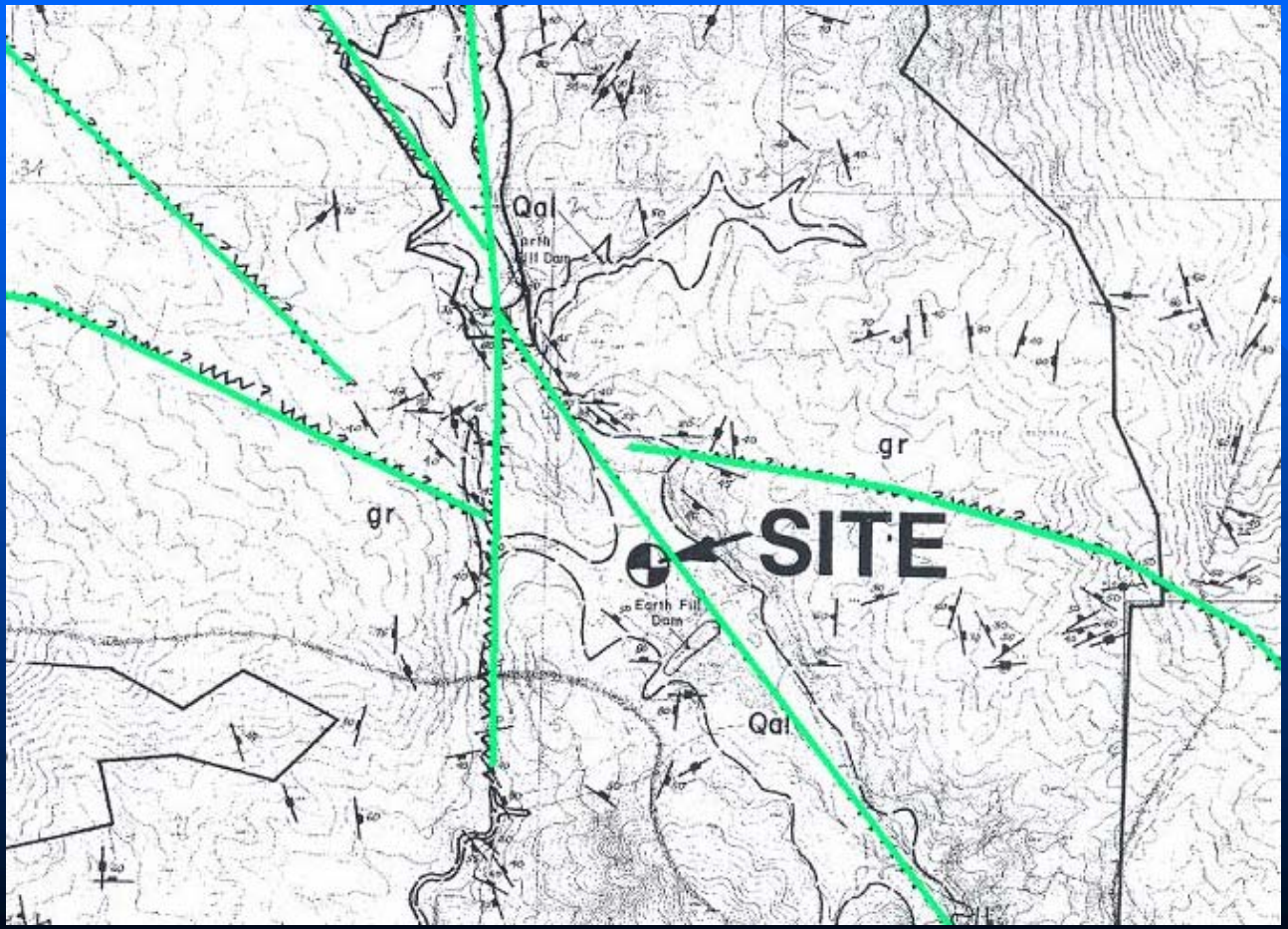
Assessment Objectives

- Complete an expedited site assessment
  - Characterize geology and hydrogeology
  - Assess distribution of contaminants of concern
  - Develop a remedial strategy

Geologic Map

USGS Geologic Quadrangle
Maps GQ1548 & GQ1555

Potential Faults

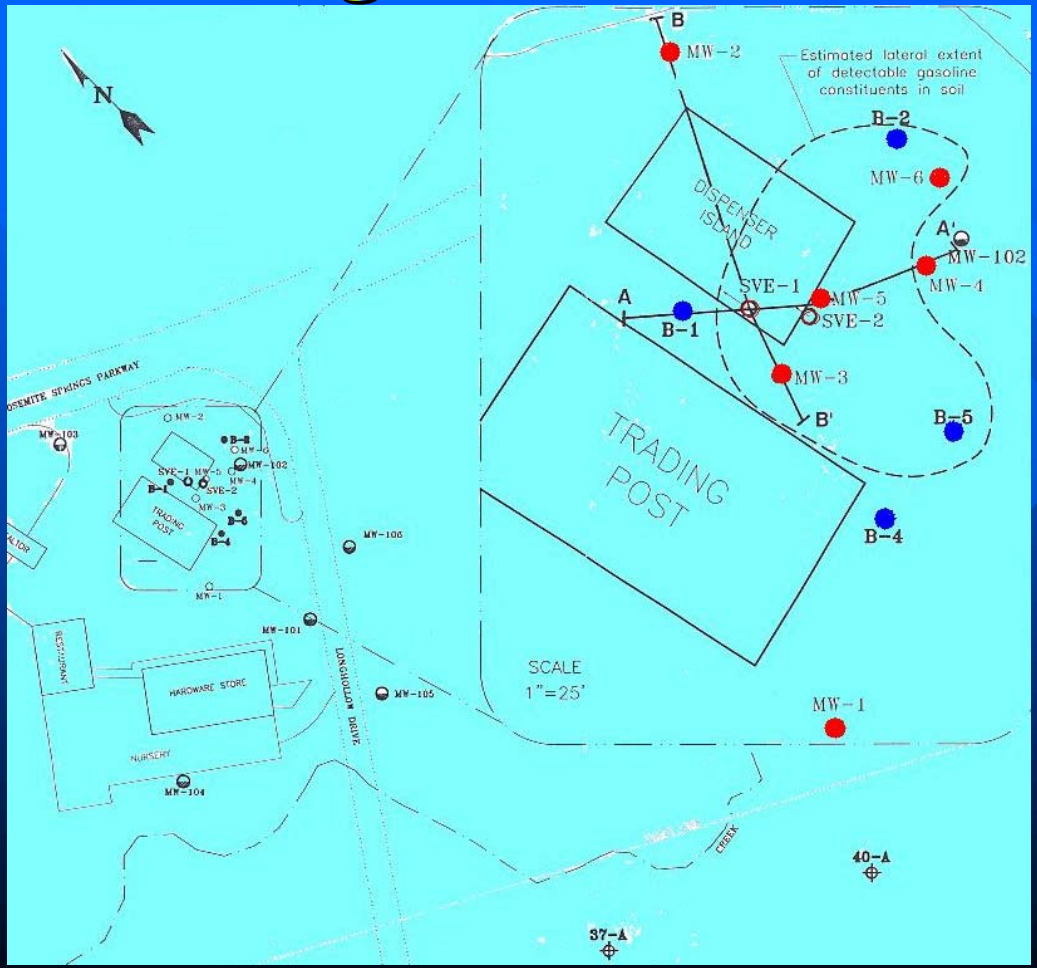


Lineaments


YOSEMITE LAKES TRADING POST
EALTY
RESTAURANT
HARDWARE STORE
N
0
200 FEET
LONG HOLLOW

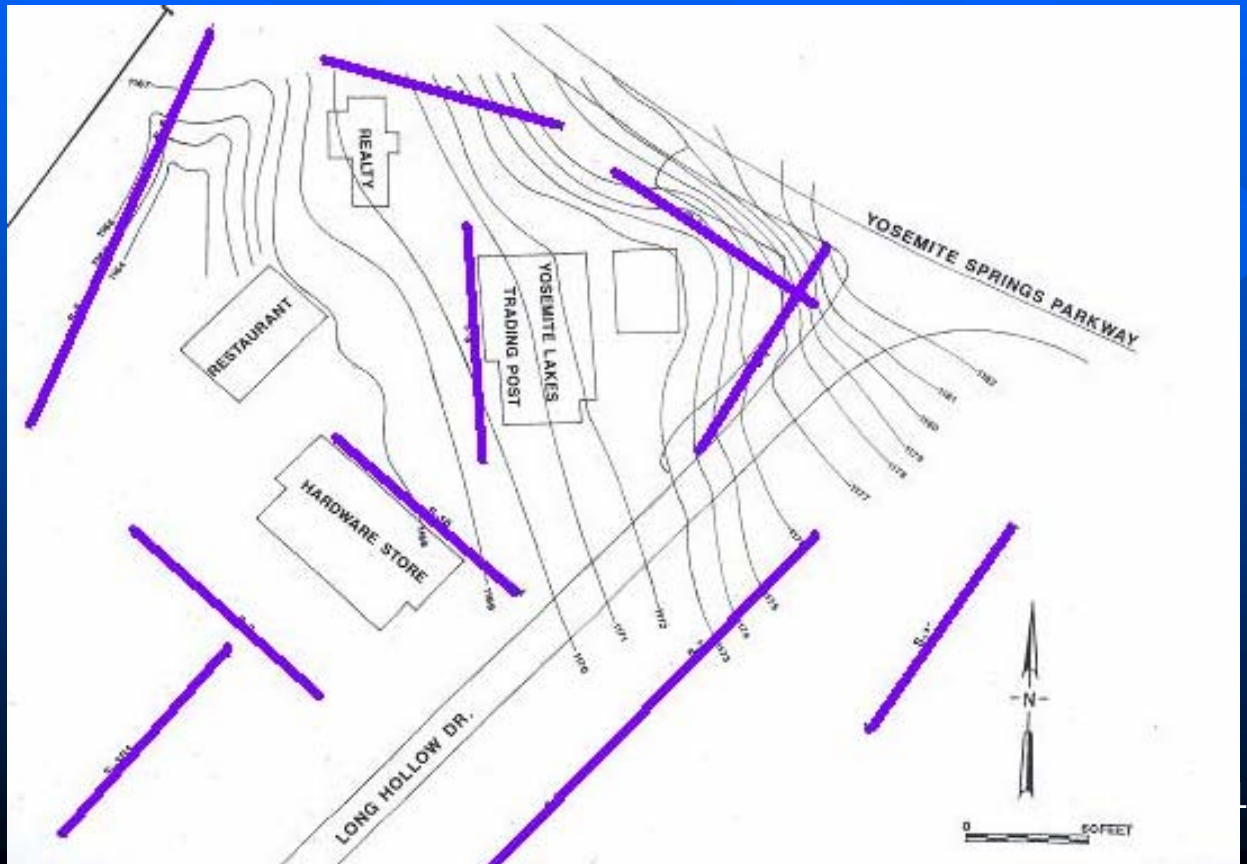
Soil Assessment

Soil Borings & Shallow Wells

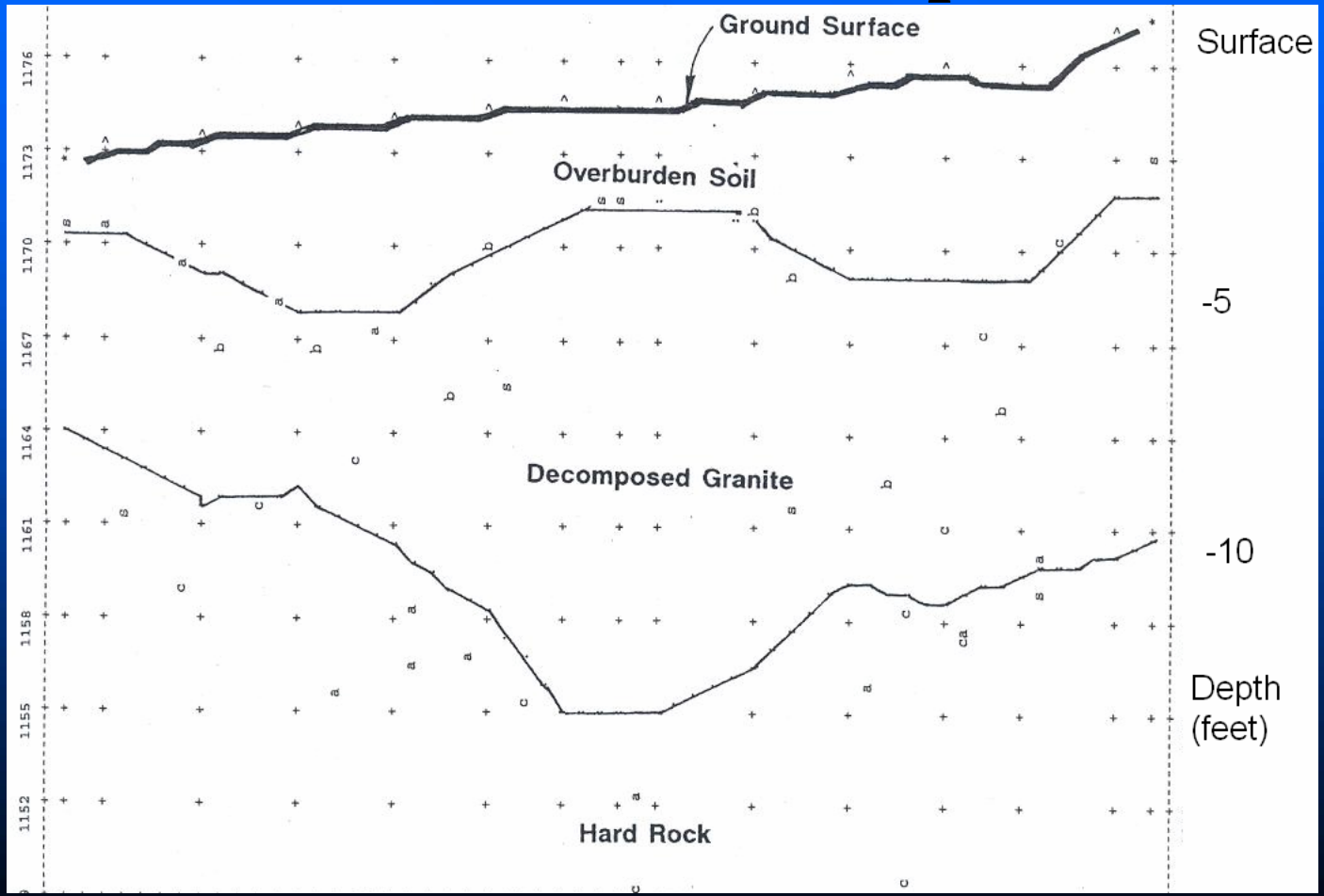


Cross-Section A-A'

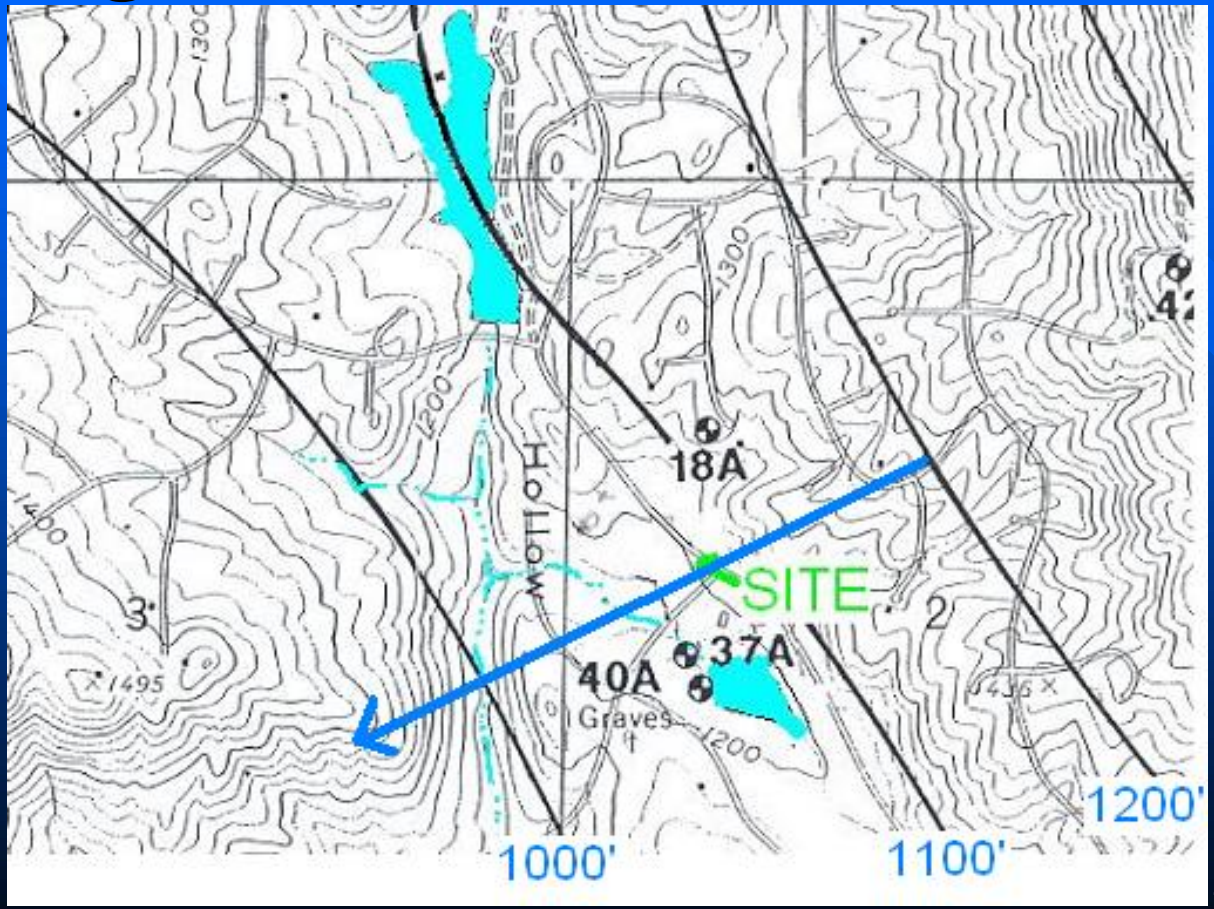
Geophysical Survey Locations



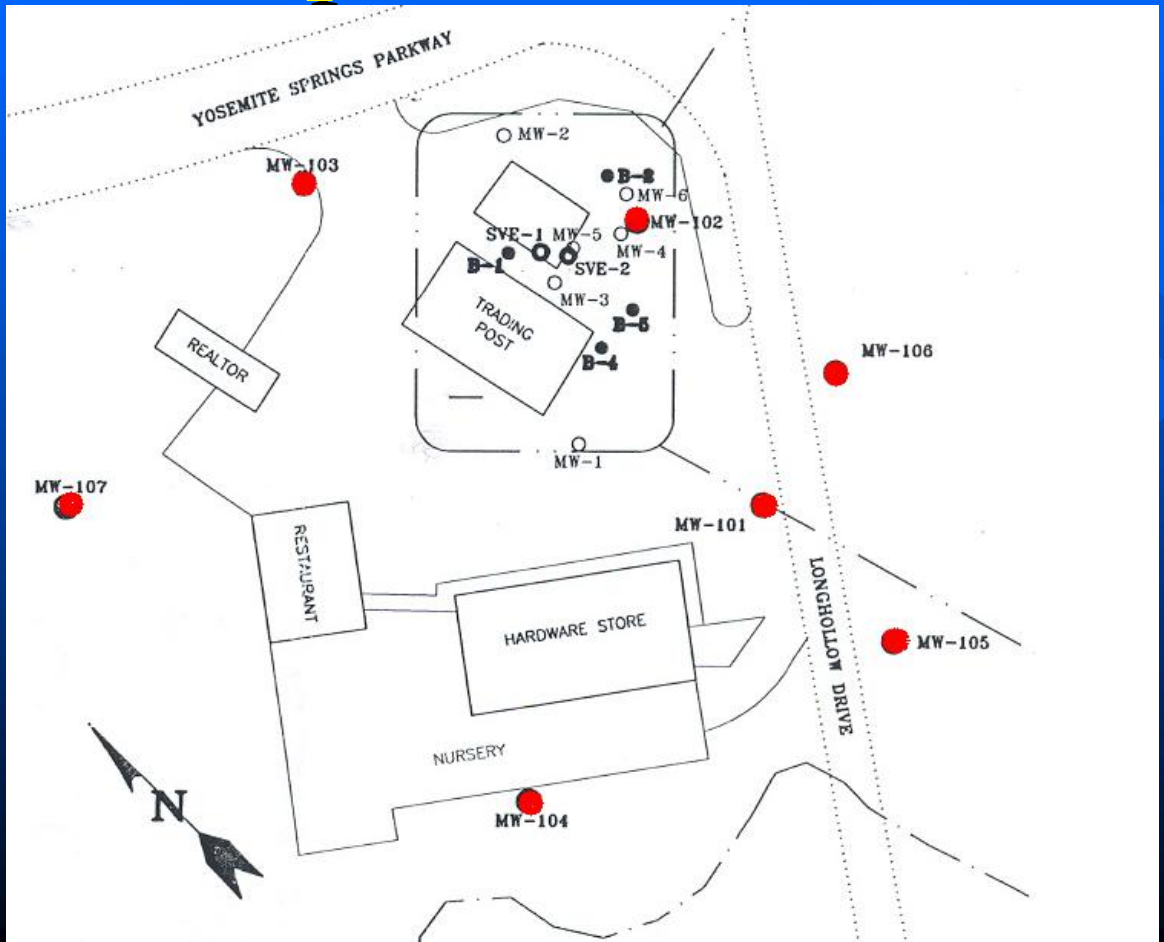
Seismic Profile Interpretation



Regional Groundwater Contours



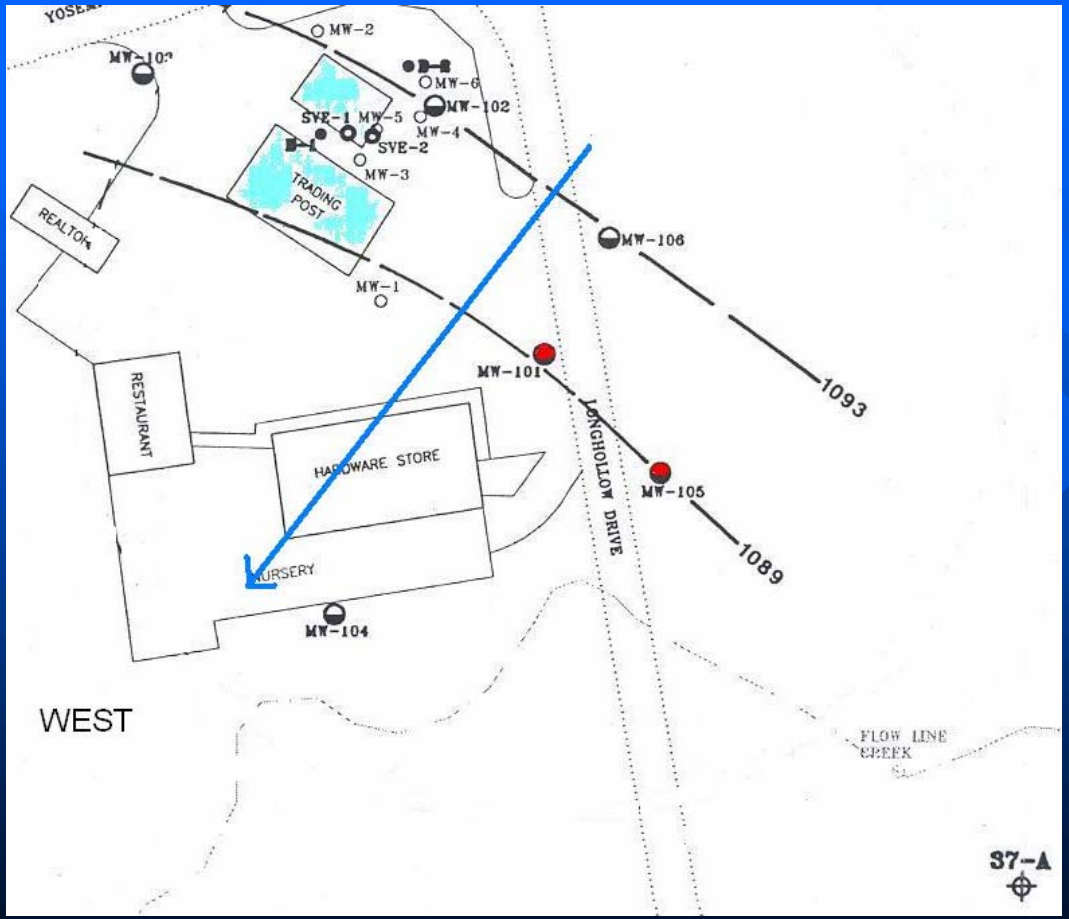
Deep Well Locations



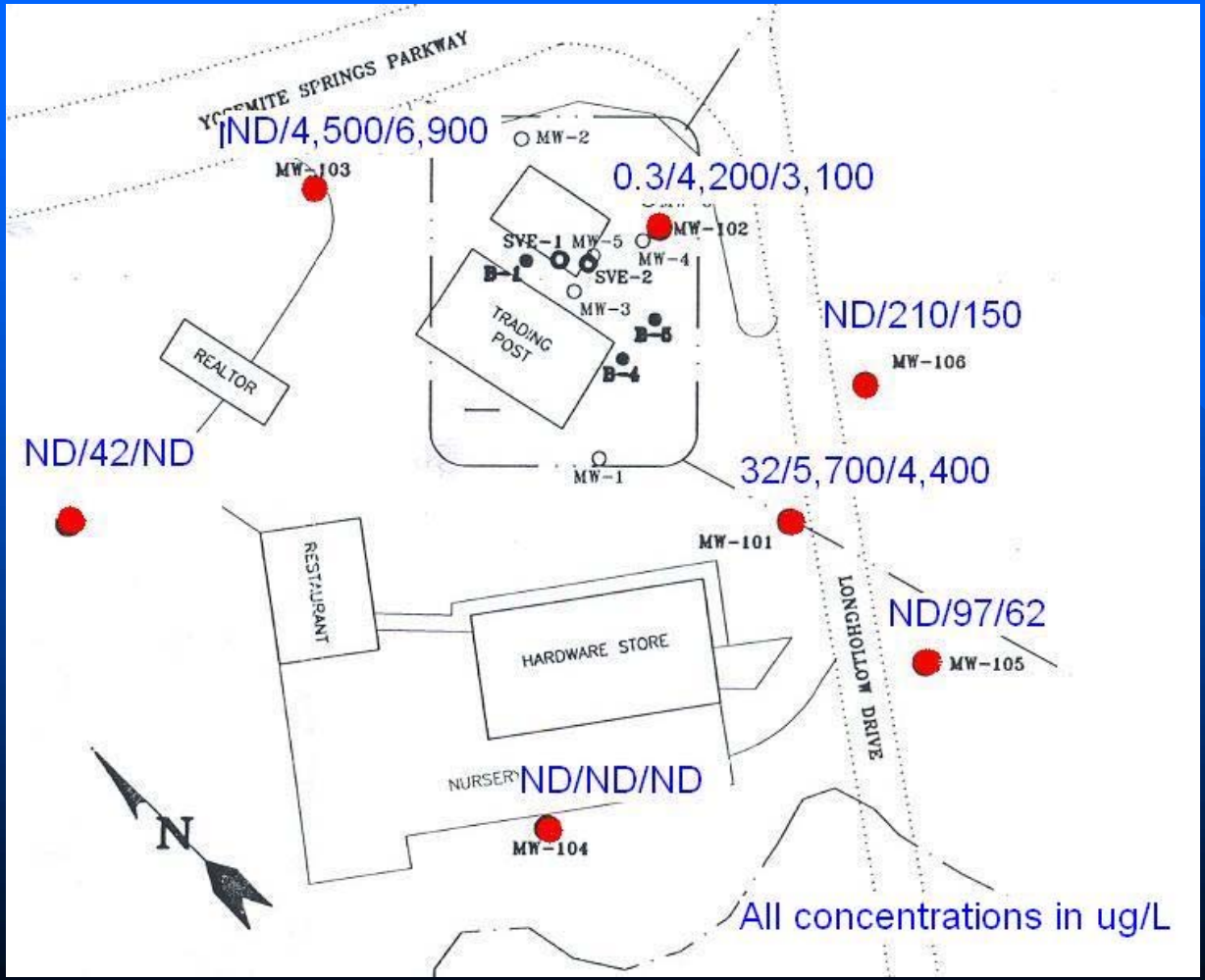
MW-101 Video Log

1) Well ID on top is 6 1/4".
2) Zero datum marked at top of casing. All side view depths are 18" less than indicated on monitor.
3) 18' Casing seam.
4) 38' End of the casing. Open bore hole in granite below this point.
5) 53' Ruff or loose formation.
6) 60', 71', 75' Small fractures
7) 78' Fracture with loose rock.
8) 82' Static water level.
9) 84' Fracture in rock.
10) 85' Yellowish growth on the granite.
11) 90' Small fracture.
12) 96'-98' White rock formation.
13) 101' Large fracture.
14) 107' Vertical fracture in rock.
15) 153' Change in formation. Also appears to be some type of growth developing in this area down to approx. 162'.
16) 162', Fracture in the rock.
17) 205', 210' Small fracture in the rock.
18) 221' Fracture with what appears to be the same growth as above.
19) 236' White formation.
20) 247' Bottom of the well.

Site Groundwater Contours

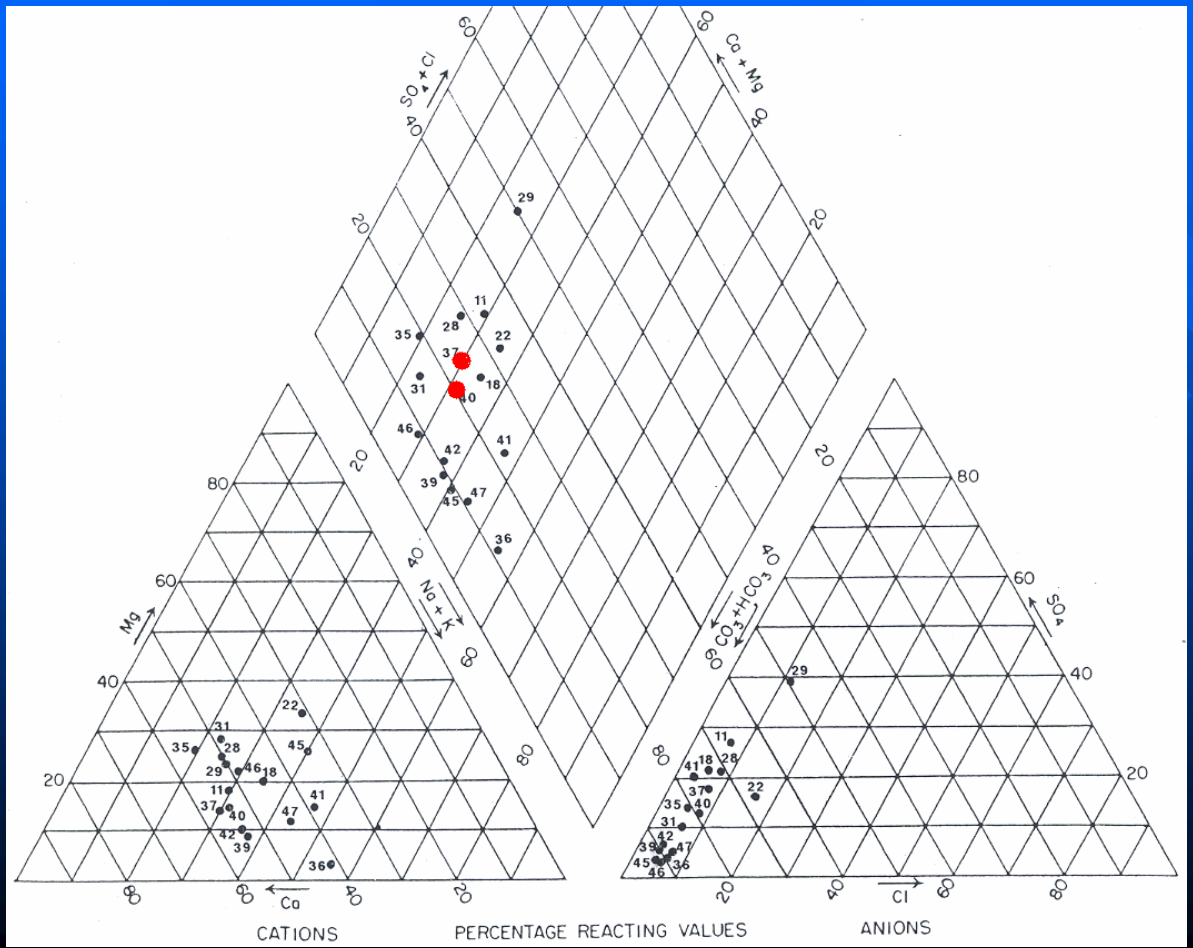


Benzene/MTBE/TBA in Groundwater,December 2000

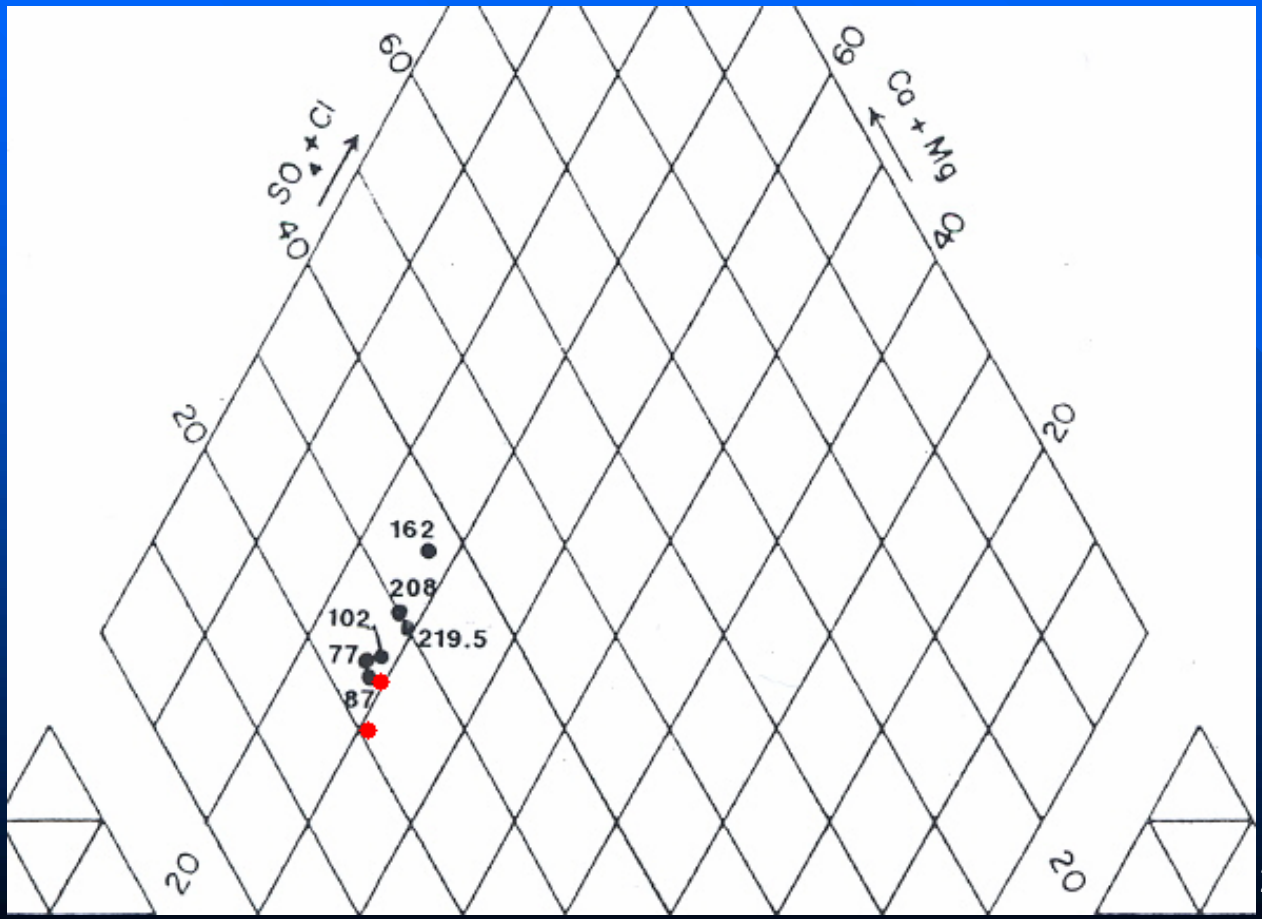


Packer Testing

YSPUC Water Quality



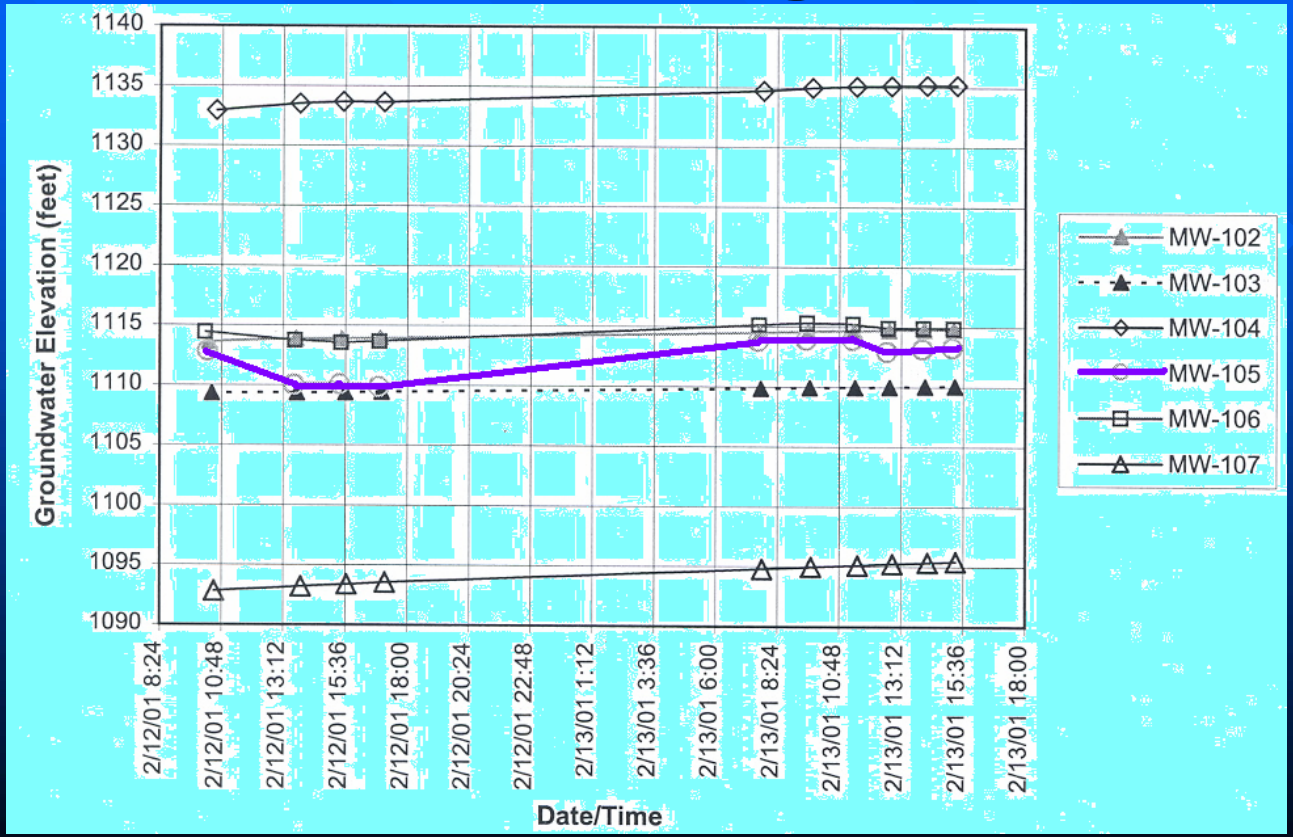
MW-101 Water Quality



MTBE/TBA in MW-101 Fractures

Fracture Depth Ft / Yield (gpm)	MTBE(ug/L)	TBA (ug/L)
77 / 1.5	2,500	<2,000
87 / 0.8	2,800	<4,000
103 / 3.3	3,300	<4,000
152 / 0.08	1,600	<1,000
162 / 3.5	430	<1,000
208 / 2.25	260	4.2
220 / 4.0	820	<1,000

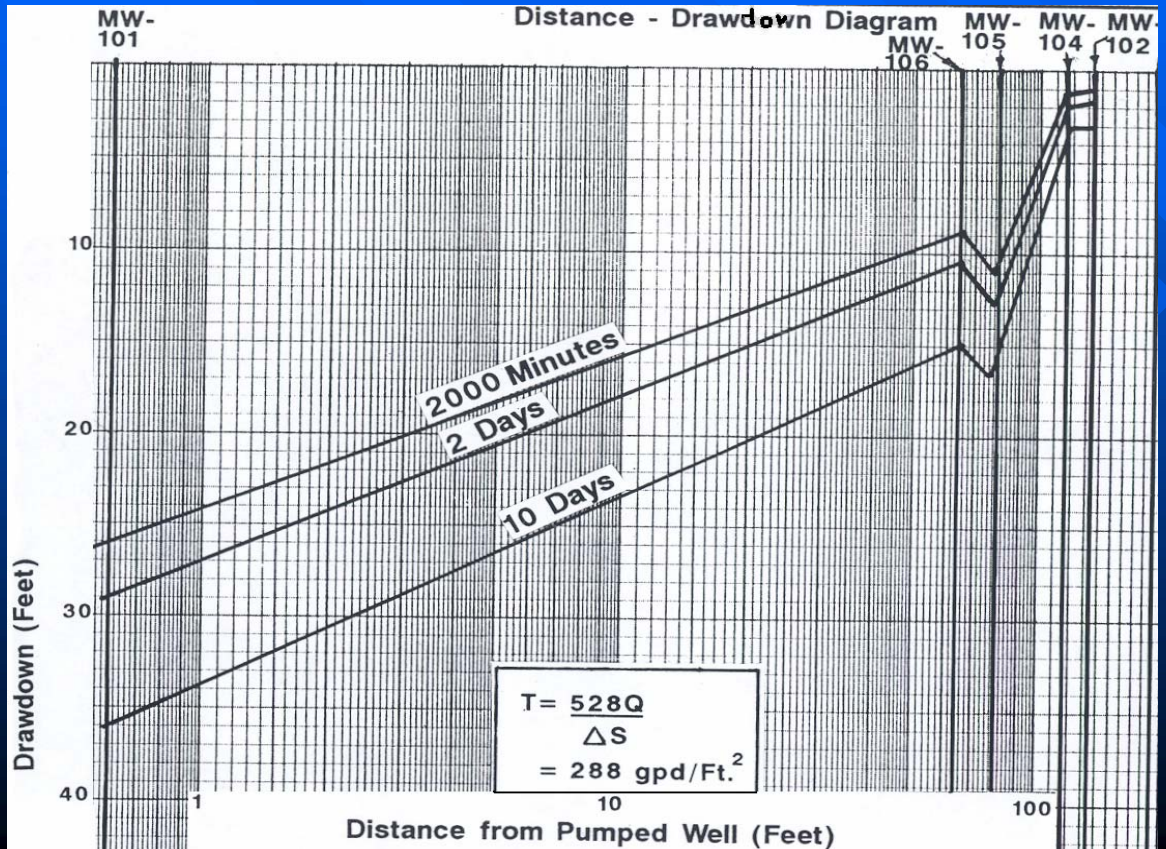
GW response to Packer Testing



Aquifer test

- 48-hour
- MTBE/TBA 1,200/2,600 ug/L after 24 hrs
- MTBE/TBA 997/2,200 ug/L after 48 hrs

Distance-Drawdown Relationships



Radius of Influence – Pumping from MW-101

Assessment Conclusions

- The extent of petroleum hydrocarbons has been defined. Vadose zone remediation should be evaluated by expedited soil vapor extraction using existing wells.
- Little groundwater is present within the alluvial/DG aquifer.
- Petroleum hydrocarbons and MTBE have passed readily into the bedrock aquifer.
- The extent of MTBE/TBA distribution has not been fully defined, but assessment is sufficient to facilitate interim remediation.
- Petroleum hydrocarbons appear to be degrading by natural attenuation.

Assessment Conclusions 2

- MTBE is relatively persistent within the aquifer, degrading slowly to TBA as oxygen is available and likely assisted by leachfield bacteria.
- MW-101 is well connected hydraulically to the MTBE plume from the station, as well as to the fault water supply feeding the impacted water supply wells.
- Groundwater extraction from MW-101 on a continuous basis at a rate of approximately 10 gpm appears feasible and is recommended.
- On site treatment for the produced water should be provided prior to discharge.

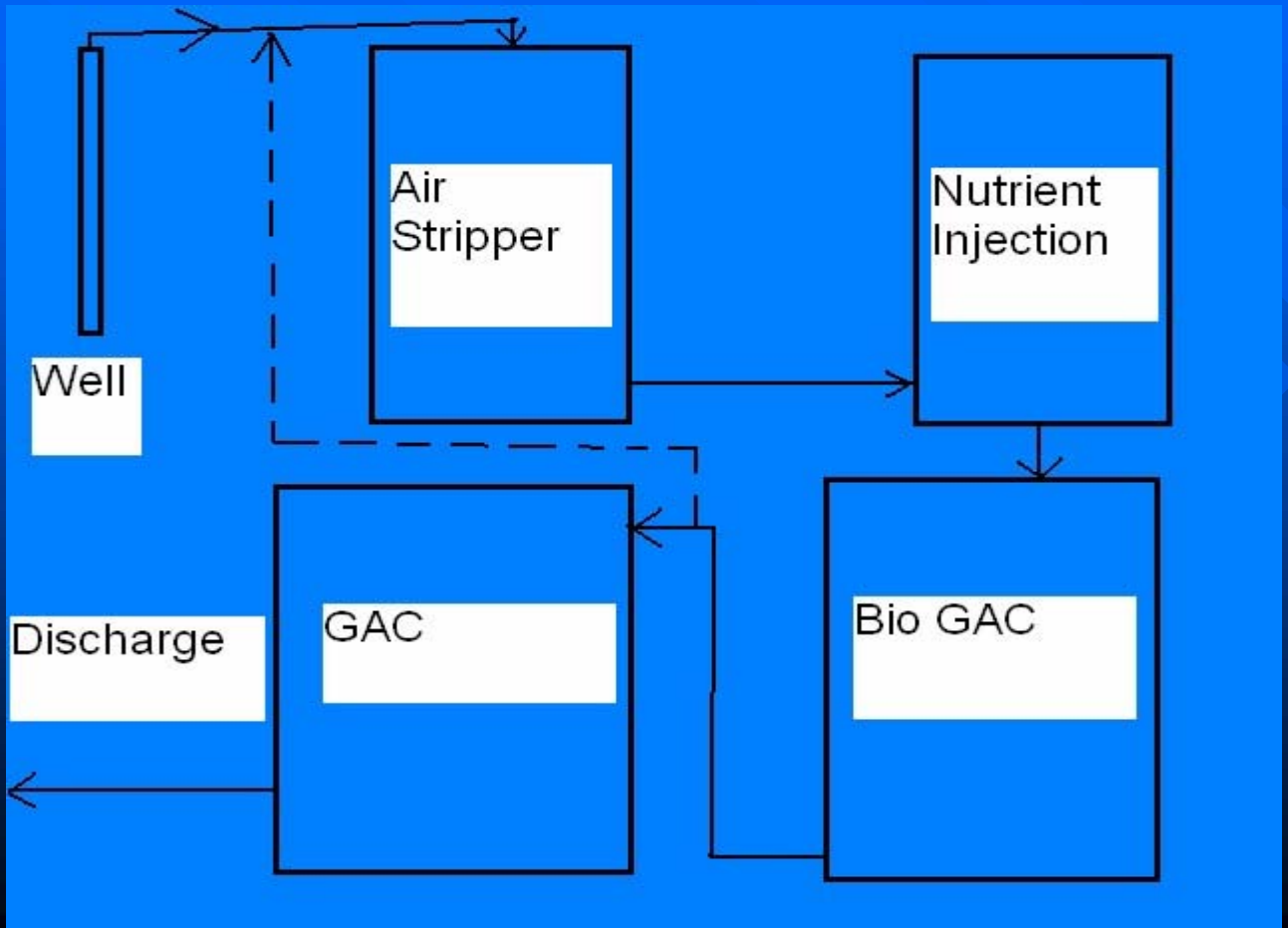
Site assessment completed, interim soil remediation underway, and report submitted with recommendations for groundwater remediation - in 7 months.

All assessment and interim remedial costs pre-approved and reimbursed by the UST Cleanup Fund.

SVE

Air Stripper

GW Remediation



GAC

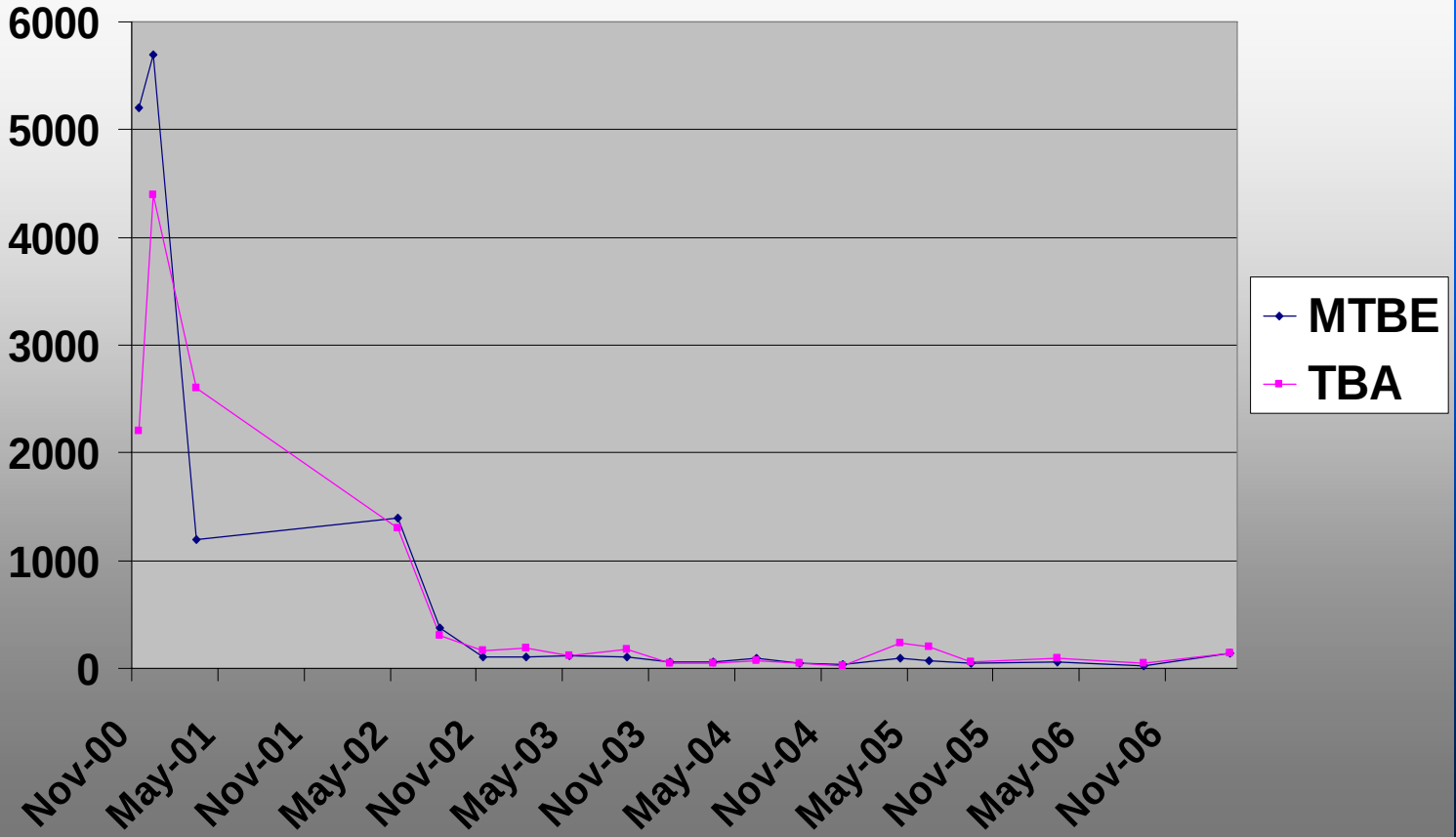

CALGON
CALGON CARBON CORPORATION
WATER TREATMENT SYSTEM
CALGON
CALGON CARBON CORPORATION
WATER TREATMENT SYSTEM

Nutrient Injection

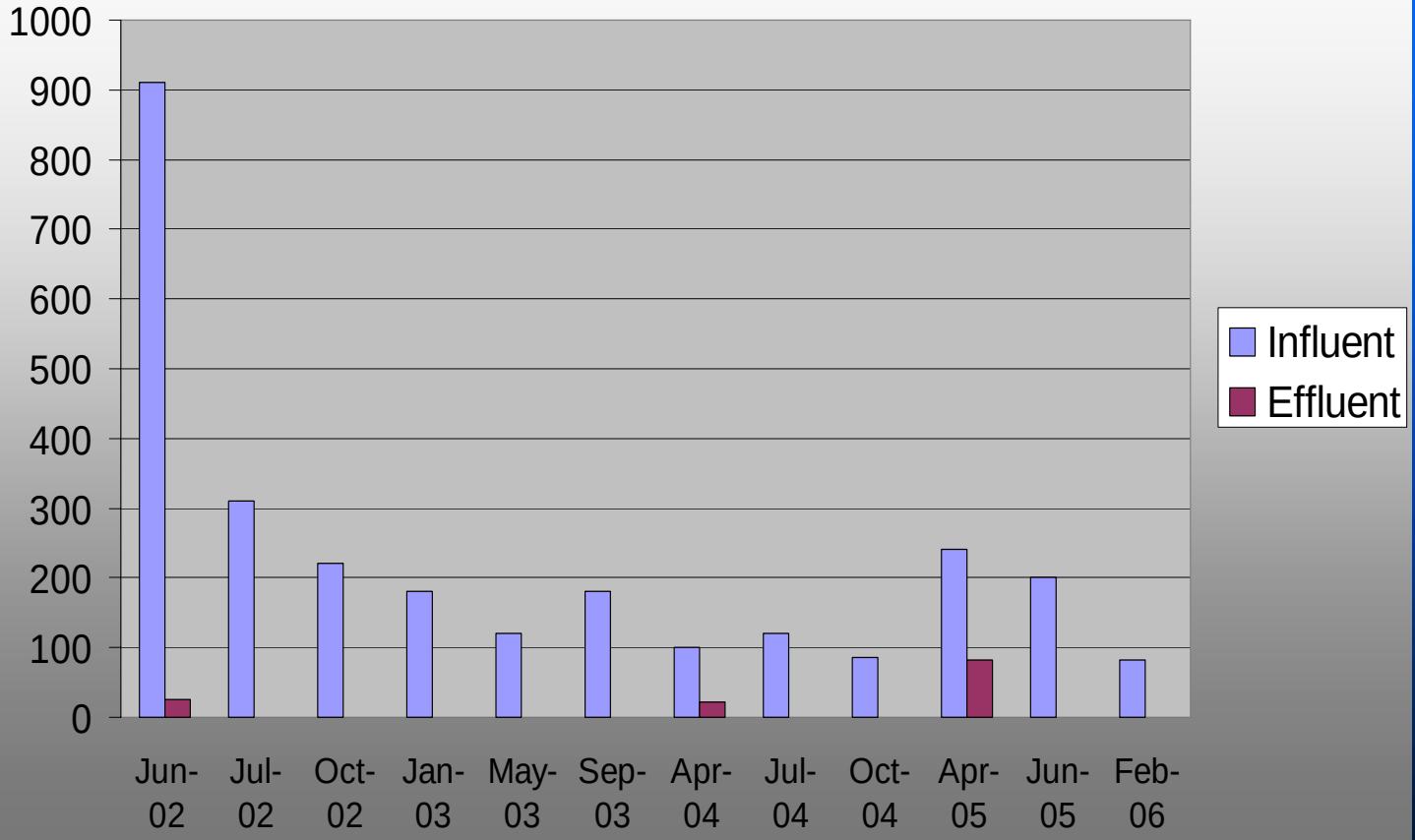
UV Disinfection

GW Treatment System

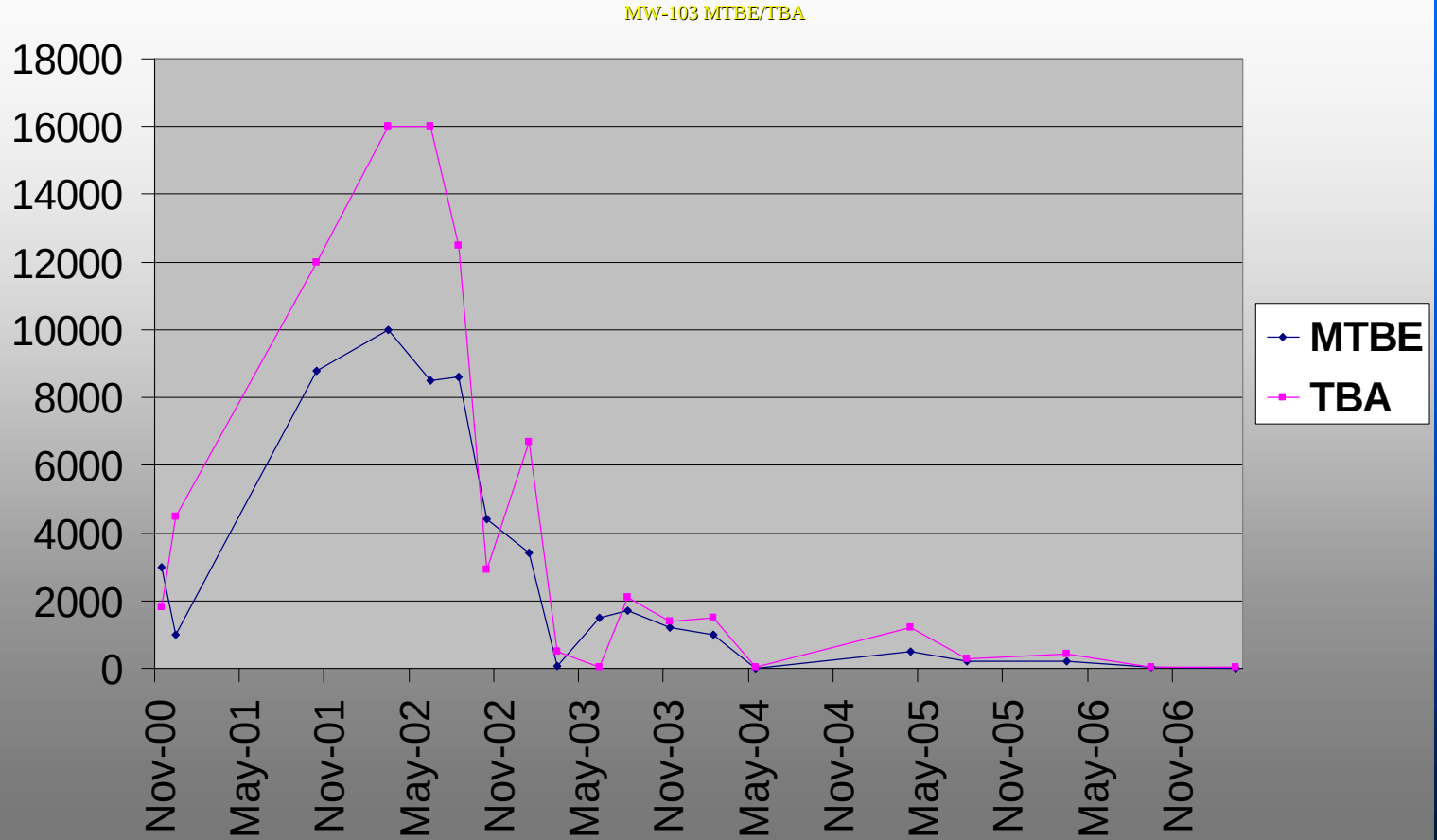
MW-101


MW-101 MTBE/TBA
6000
5000
4000
3000
2000
1000
0
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Nov-04
May-05
Nov-05
May-06
Nov-06
MTBE
TBA

Airstripper TBA Concentrations

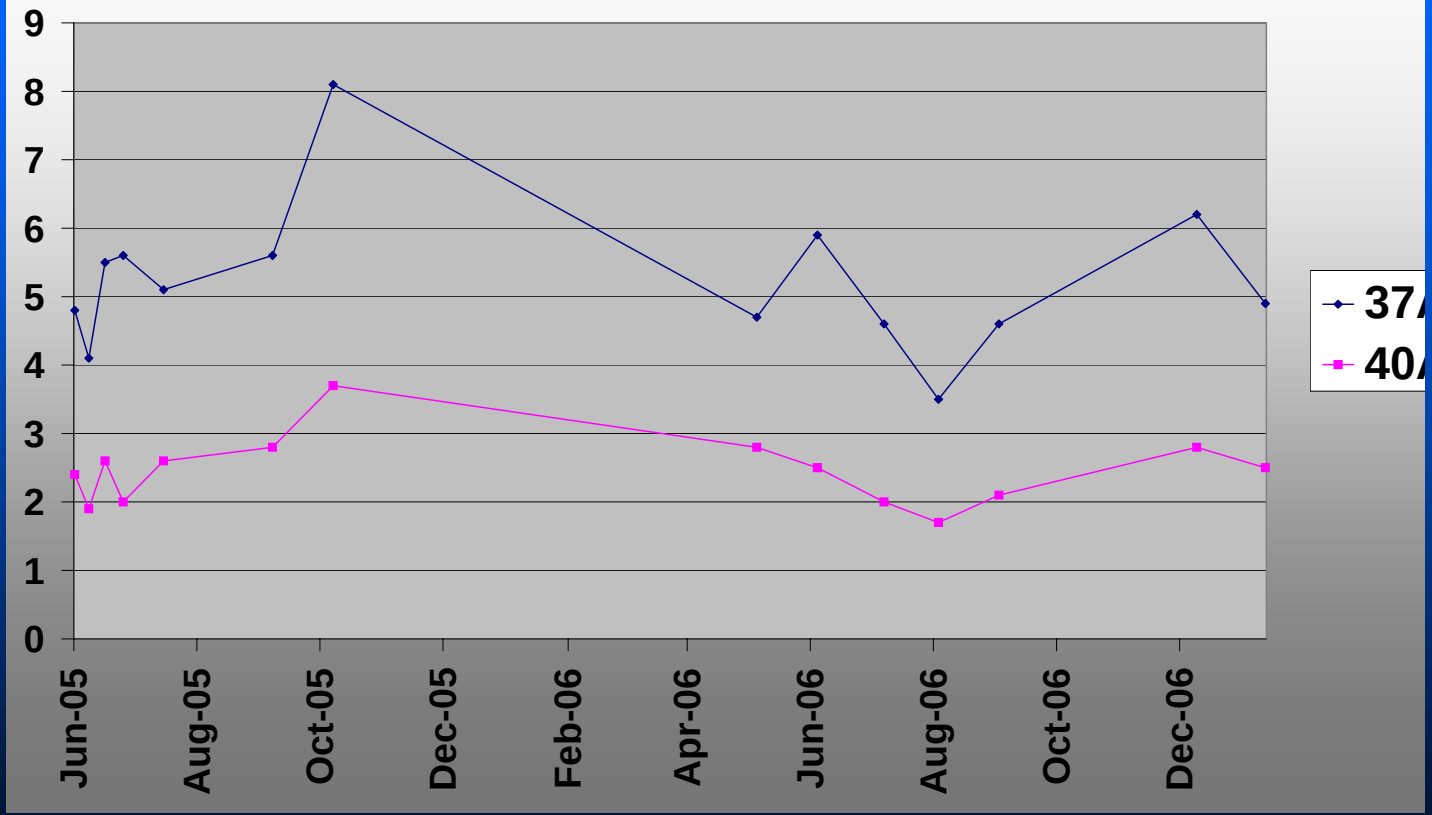


MW-103 MTBE/TBA



Wellhead Treatment – 37A

MTBE 37A/40A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37
40

Regulatory and UST Cleanup Fund Considerations

- Close Communication is critical to Expedited site Assessment
  - Verbal updates to Regional Water Board
  - Field observations by Regional Water Board
  - E-mail pre-approval requests to Cleanup Fund